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DEVELOPMENT OF MOTION LEARNING MEDIA AND ENERGY CONSERVATION LAW THROUGH COASTER TRACKS BASED ON LOGERPRO ANALYSIS

PENGEMBANGAN MEDIA PEMBELAJARAN GERAK DAN HUKUM KEKEKALAN ENERGI MELALUI COASTER TREK BERBASIS ANALISIS LOGERPRO

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Abstract

Research has been conducted to find out the graph of the relation between position and speed to time, for objects that glide on a magnetic foundation by applying the Research and Development method. Data retrieval is done by using video train motion recordings which are analyzed using Pro Loger. The results of the analysis are represented in the form of data and graphics. Based on the data analysis and fitting using the Loger Pro, the following values are obtained: v_{train} 0.027 m/s, a_{train} 0.034 m/s^2, average train velocity 0.02572 m/s and average train acceleration 0.03662 m/s^2 with RMSE value (Root Mean Square Error) of 0.013 m. The acceleration value obtained is very small and almost close to zero, so it can be said that objects that experience regular irregular motion. The graph representation of velocity over time shows an increase in speed that is not constant. This is because there is still friction between the train and the runway and friction between magnets along the track with friction forces 4,566 N. The value of kinetic energy, potential energy, and mechanical energy can be determined by using the results of Pro Loger analysis.

Key words: *acceleration; conservation energy; position; velocity*

Abstrak

Telah dilakukan penelitian untuk mengetahui grafik keterkaitan posisi dan kecepatan terhadap waktu, untuk benda yang meluncur di atas landasan magnetik dengan menerapkan metode Research and Development. Pengambilan data dilakukan dengan menggunakan video rekaman gerak kereta yang dianalisis menggunakan Loger Pro. Hasil analisis direpresentasikan dalam bentuk data dan grafik. Berdasarkan analisis dan fitting data menggunakan Loger Pro diperoleh nilai sebagai berikut v_{kereta} 0,027 m/s, a_{kereta} 0,034 m/s^2, $v_{rata\text{-}rata}$ kereta 0,02572 m/s dan $a_{rata\text{-}rata}$ kereta 0,03662 m/s^2 dengan nilai RMSE (Root Mean Square Eror) sebesar 0,013 m. Nilai percepatan yang diperoleh sangat kecil dan hampir mendekati nol, sehingga dapat dikatakan bahwa benda yang

mengalami gerak lurus beraturan. Representasi grafik kecepatan terhadap waktu memperlihatkan pertambahan kecepatan yang tidak konstan. Hal ini dikarenakan masih terdapat gesekan yang terjadi antara kereta dengan landasan maupun gesekan antar magnet di sepanjang lintasan dengan gaya gesek 4,566 N. Nilai energi kinetik, energi potensial, dan energi mekanik dapat ditentukan besarnya menggunakan data hasil analisis Loger Pro.

Kata kunci: kekekalan energi, kecepatan, percepatan, posisi